Claims

1. A process for producing a fibre composition comprising a lignocellulosic fibre material containing phenolic or similar structural groups, and a synthetic, electrically conductive polymer formed by polymerized monomers, according to which process the monomers are polymerized in the presence of the lignocellulosic fibre material to form a composition in which the polymer is bound to the fibres, characterized by

a) oxidizing the phenolic groups or the groups having a similar structure to provide an oxidized fibre material,

b) contacting the oxidized fibre material with a bifunctional substance to provide a modified lignocellulosic fibre material capable of binding monomers of the conductive polymer, and

c) contacting the modified lignocellulosic fibre material with monomers of the conductive polymer under conditions conducive to polymerization to produce polymer chains of the synthetic, electrically conductive polymer, which are grafted to the surface of the lignocellulosic fibre material.

2. The process according to claim 1, wherein the oxidized fibre material is contacted with the bifunctional monomers of the synthetic, electrically conductive polymer in order to bind the monomers to the surface of the oxidized lignocellulosic fibre material, to provide a modified lignocellulosic fibre material having monomers bound to its surface, and the modified lignocellulosic fibre material is contacted with the monomers to produce polymer chains of the synthetic, electrically conductive polymer, which are grafted to the surface of the lignocellulosic fibre material.

3. The process according to claim 1, wherein the modifying agent is activated with an oxidizing agent.

4. The process according to any of claims 1 to 3, wherein the lignocellulosic fibrous matrix is reacted with an oxidizing agent in the presence of a substance capable of catalyzing the oxidation of phenolic groups or groups having a similar structure by said oxidizing agent.

5. The process according to any of claims 1 to 4, wherein the reaction of step (a) is carried out in an aqueous phase at a consistency of about 1 to 95 % by weight of the fibre material.

6. The process according to any of claims 1 to 5, wherein the polymer is selected from the group of polyaniline, polypyrrole, polythiophene and polyacetylene and derivatives thereof.

7. The process according to any of claims 1 to 6, wherein the bifunctional substance has at least two functional groups, where the first functional group participates in the binding of the modifying compound to the lignocellulosic fibre material and the second functional group forms a primer for binding to the polymeric material.

8. The process according to claim 7, wherein the modifying agent comprises at least one phenolic hydroxyl or similar structural group as a first functional group.

9. The process according to claim 7 or 8, wherein the second functional group is selected from the group of hydroxy, carboxy, anhydride, aldehyde, ketone, amine, amide, imine, imidine and derivatives and salts thereof.

10. The process according to any of claims 7 to 9, wherein the modifying agent comprises a plurality of second functional groups.

11. The process according to any of the preceding claims, wherein the bifunctional substance and the monomer are different.

12. The process according to any of the preceding claims, wherein the bifunctional substance and the monomer are the same.

13. The process according to any of the preceding claims, wherein the fibres are selected from lignocellulosic fibres produced by mechanical, chemimechanical or chemical pulping.

14. The process according to any of claims 4 to 13, wherein the substance capable of catalyzing the oxidation of phenolic or similar structural groups to provide an oxidized fibre material is an enzyme.

15. The process according to any of the preceding claims, wherein steps (a) to (c) are carried

out simultaneously by forming in an aqueous medium a mixture of lignocellulosic fibres and the monomer, oxidizing phenolic or similar structural groups on the lignocellulosic fibres while binding the monomers to the oxidized phenolic or similar structural groups.

16. The process according to claim 15, wherein the enzyme is added to the aqueous medium in order to oxidized the phenolic or similar structural groups.

17. The process according to any of claims 14 to 16, wherein the enzyme capable of catalyzing the oxidation of phenolic groups is selected from the group of peroxidases and oxidases.

18. The process according to claim 17, wherein the enzyme is selected the group of laccases (EC 1.10.3.2), catechol oxidases (EC 1.10.3.1), tyrosinases (EC 1.14.18.1), bilirubin oxidases (EC 1.3.3.5), horseradish peroxidase (EC 1.11.1.7).

19. The process according to claim 17 or 18, wherein the enzyme dosage is from about 1 to 100,000 nkat/g, preferably 10-500 nkat/g, and it is employed in an amount of 0.0001 to 10 mg protein/g of dry matter.

20. The process according to claim 19, wherein the enzyme treatment is carried out at a temperature of 5 – 100 °C, preferably 10 – 85 °C and most preferably at 20 – 80 °C and pH 3 – 12.

21. The process according to any of claims 3 to 20, wherein the oxidizing agent is selected from the group of oxygen and oxygen-containing gases, such as air and hydrogen peroxide.

22. The process according to claim 21, wherein oxygen or oxygen-containing gas or hydrogen peroxide is introduced into the aqueous slurry during the reaction.

23. The process according to any of claims 1 to 13, wherein a chemical oxidizing agent is used.

24. The process according to claim 22, wherein the chemical oxidizing agent is hydrogen

peroxide, Fenton reagent, potassium permanganate, ozone and chloride dioxide or an inorganic transition metal salt, ammoniumperoxy sulphate

25. The process according to claim 1, wherein radical forming radiation capable of catalyzing the oxidation of phenolic or similar structural groups is used to provide an oxidized fibre material.

26. The process according to any of the preceding claims, wherein the reaction steps are carried out sequentially or simultaneously.